

St. Jean du Maroni, August. The latter is partially damaged and mounted on a slide. It is in the collection of the Muséum National d'Histoire Naturelle, Paris.

***Ceracia dentata* a parasite of *Chimarocephala pacifica*
pacifica in California**

(Diptera : Tachinidae and Orthoptera : Acrididae)

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Ceracia dentata (Coquillett, 1895), is a well-known endoparasite of Acrididae, having been reared from three of its subfamilies—the Cyrtacanthacridinae, Oedipodinae, and Acridinae. As early as 1897, Coquillett (1897, p. 9) recorded this tachinid as a parasite of *Chortophaga viridifasciata* (De Geer) on the basis of a rearing by T. Pergande from an adult collected at St. Louis, Missouri in June 1877. Subsequently it has been recorded from at least eight species of *Melanoplus* (Cyrtacanthacridinae), *Cammula* and *Chortophaga* (Oedipodinae), and *Aulocara* and *Psoloessa* (Acridinae). References to these rearings are listed in Greathead's (1963) very useful paper on insect enemies of Acridoidea.

Data on rearings of *Ceracia dentata* from a new host genus and species, *Chimarocephala pacifica pacifica* (Thomas) collected in the city of San Francisco, are presented below. Of the two subspecies of *Chimarocephala pacifica*, our rearings have been made from the nominate subspecies which occurs in the Coast Ranges from Sonoma County south into Monterey County. The females occur in several color phases, from brown to green, with most of our rearings from the former.

From four female nymphal grasshoppers of *C. p. pacifica* collected on the San Miguel Hills (elevation about 500 feet) in San Francisco, California, a total of 14 *C. dentata* larvae emerged. The nymphs were collected alive at the end of December 1959 and during January 1960 by Rentz, from green grassy slopes having southern exposures. These were briefly reported upon by Rentz (1961) without naming the tachinid. Both adult and nymphal stages of *C. p. pacifica* were collected together, however, only the nymphal females produced parasites. Only four of approximately 50 field collected nymphs produced *C. dentata* parasites.

In the San Miguel Hills, located in an area of relatively mild winter temperatures, the grasshopper nymphs were observed from late November, through December and in January. Adult *C. dentata* are active throughout the year in central California, utilizing *C. p. pacifica* as a winter host. Our rearings were from the nymphal stage, however, two adult females collected in 1961 had attached eggs of *C. dentata*. The adult *C. p. pacifica* occur only into the spring, and they are then absent in the summer and early fall, with the nymphs reappearing in the late fall.

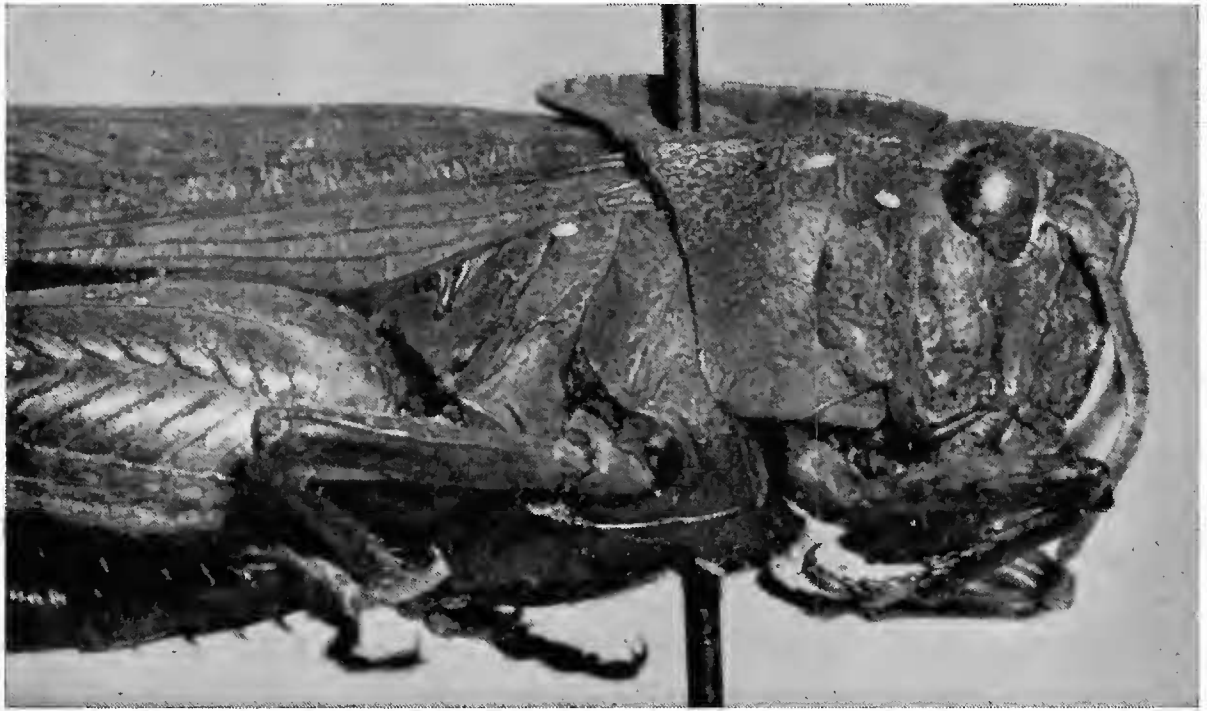
Ceracia is reported to glue its eggs on the host and the larvae to gain entry through the host integument. Several adult females collected and killed in the field in 1961, upon later examination, showed several eggs on the head, thorax, and hind femur, which are presumed to be the eggs of *C. dentata*. One of these females, with eggs attached to pronotum and metapleura, is illustrated in Fig. 1. Only one of the four parasitized nymphs bore two eggs on its integument at the time of its death; the others had none.

The rearings were made at room temperatures at the California Academy of Sciences. The adult parasites were maintained in pint jars without the addition of water or food. The four rearings of *C. dentata* from female grasshopper nymphs, summarized in Table 1, are as follows:

REARING 1.—Brown phase, collected 26 December 1959, with enlarged abdomen, sluggish in movement. On 29 December 1959, three larvae emerged from host abdomen between 1100–1330 hours, here reported as first group, and two additional larvae emerged and pupated after 1700 hours and before 0740 hours 30 December 1959, reported as second group. Of the first group, one male emerged 15 January 1960 and was killed in cyanide 17 January 1960, while the two females emerged 17 January 1960 and died 26 January 1960. Of the second group, one male emerged 15 January 1960 and was killed in cyanide on 17 January 1960, while nothing emerged from one puparium.

Table 1. Summary of rearings of *Ceracia dentata*.

Rearing	1	2	3	4
Number of <i>C. dentata</i>	5	3	2	4
Sexes	2 ♂ ♂, 2 ♀ ♀, 1?	2 ♂ ♂, 1?	1 ♂, 1?	2 ♂ ♂, 1 ♀, 1?
Length of pupation	17–19 days	12 to 14 days, data incomplete	10 (+ ?) days, data incomplete	16 days
Length of adult life	2 ♀ ♀—9 days 2 ♂ ♂—unknown	2 ♂ ♂—5 days 1 ♀—7 days	1 ♂—6 days	1 ♂, 1 ♀—8 days 1 ♀—9 days



EXPLANATION OF FIGURE

Fig. 1. Adult female of *Chimarocephala pacifica pacifica* (Thomas), right lateral view, with three eggs of *Ceracia dentata* (Coquillett) attached to pronotum and metapleuron. Specimen collected at Twin Peaks, San Francisco, California, 4 February 1961 (D. C. Rentz). Photographic print kindly made by Mrs. Marjorie S. Favreau from a negative taken by Arnaud.

REARING 2.—Brown phase, collected 17 January 1960. On 18 January 1960 three larvae emerged and pupated same day. Two males and one female emerged on weekend 30 or 31 January 1960 to 1 February 1960. Both males died 5 February 1960; the female died 7 February 1960.

REARING 3.—Brown phase, found dead 16 January 1960 in rearing cage, with two puparia nearby. One male emerged 26 January 1960 and died 1 February 1960. Nothing emerged from one puparium.

REARING 4.—Green phase, collected 16 January 1960. Four larvae emerged and pupated same day. Two females and one male emerged 1 February 1960. The male and one female died 9 February 1960; the second female died 10 February 1960. Nothing emerged from one puparium.

LITERATURE CITED

- COQUILLET, D. W. 1897. Revision of the Tachinidae of America north of Mexico. U. S. Dept. Agric., Div. Ent., Tech. Ser. No. 7, p. 1-154 (revised index, p. 149-156).
- GREATHEAD, D. J. 1963. A review of the insect enemies of Acridoidea (Orthoptera). Trans. Roy. Entomol. Soc. London, 114(14): 437-517, figs. 1-66.
- RENTZ, D. C. 1961. [Parasitism of *Chimarocephala pacifica pacifica* (Thomas)]. Pan-Pac. Entomol., 37(1): 60.